

## **The Objectives**

- 1- Distinguish endocrine from exocrine glands**
- 2- Distinguish unicellular and multicellular glands**
- 3- Recognize that multicellular glands are classified as either simple (single unit) or compound (multiple, branched units).**
- 4- What are the types of secretory products?**
- 5- Explain the mechanisms of secretion in glands?**

## **Epithelial Secretion/Glands**

Glandular epithelial cells may synthesize, store, and secrete proteins (eg, pancreas), **lipids** (eg, adrenal, sebaceous glands), or complexes of **carbohydrates and proteins** (eg, salivary glands). The mammary glands secrete all **three** substances. Less common are the cells of glands that have low synthesizing activity (eg, sweat glands) and that secrete mostly substances transferred from the blood to the lumen of the gland.

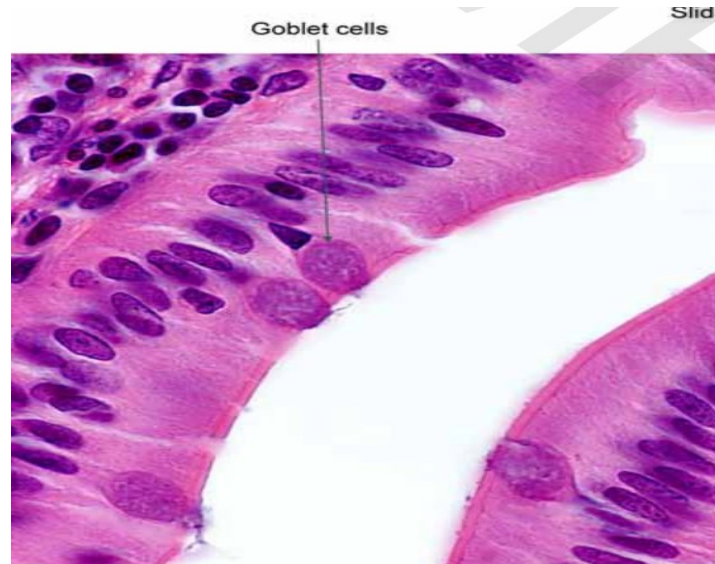
The major function in many epithelial cells is synthesis and secretion of specialized products; organs composed primarily of such epithelia are called glands.

Glands develop during fetal life from covering epithelia by means of cell proliferation and invasion of the subjacent connective tissue, followed by further differentiation.

**Classification:** Glands are classified into two types on the basis of the *site of secretion*. Exocrine glands secrete into a duct or onto a surface. Endocrine glands secrete into the bloodstream.

## **1. Exocrine glands**

**a. Unicellular glands:** are composed of a single cell (e.g., goblet cells in tracheal epithelium).



## **b. Multicellular glands**

(1) Multicellular glands are classified according to **duct branching** as (a) *simple glands* (duct does not branch) or *compound glands* (duct branches).

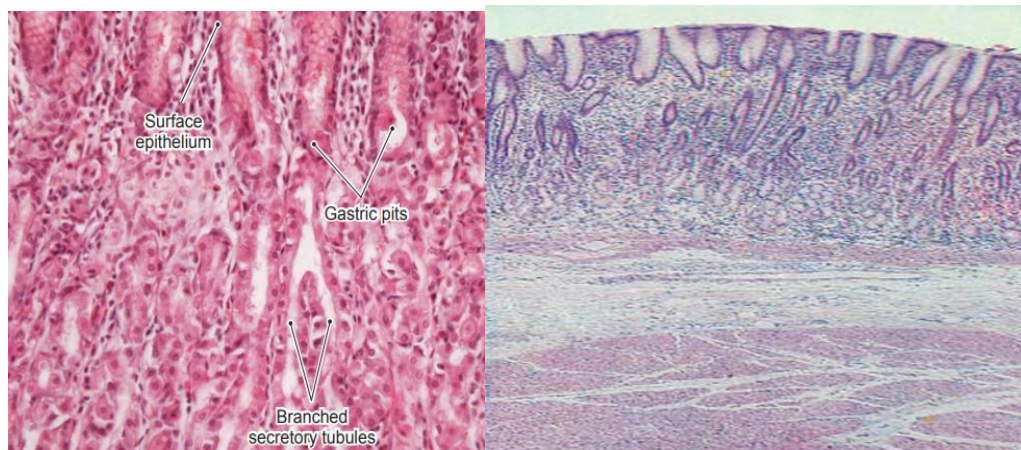
(b) They are further classified *according to the shape of the secretory unit* as :

### **Simple exocrine glands**

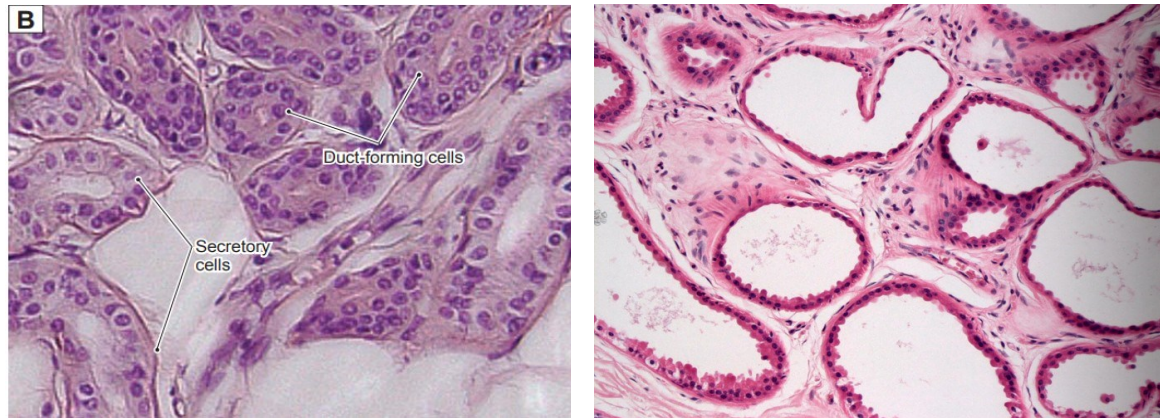
(1) **Simple tubular glands** have no ducts. The secretory cells are arranged in straight tubules. This type of gland can be found in small and large intestines.



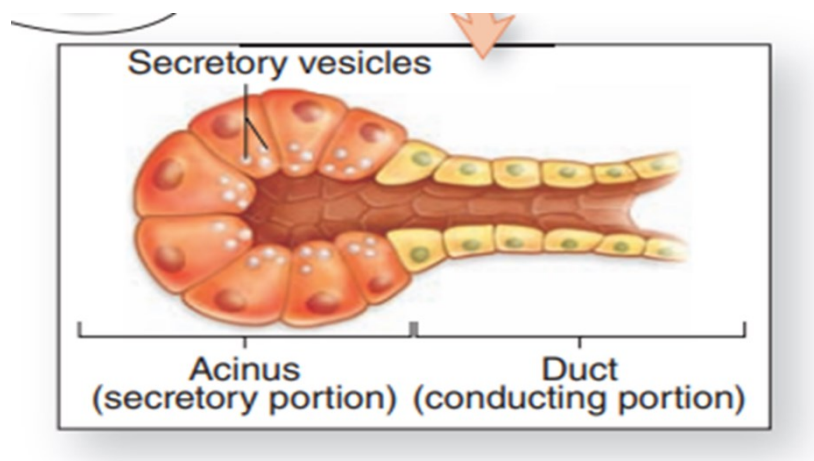
(2) **Simple branched tubular glands** do not have ducts, and their secretory cells are split into two or more tubules. This type of gland can be found in the stomach.



(3) **Simple coiled tubular glands** have a long duct, and secretory cells are formed by coiled tubules. Sweat glands are examples of this type of gland.

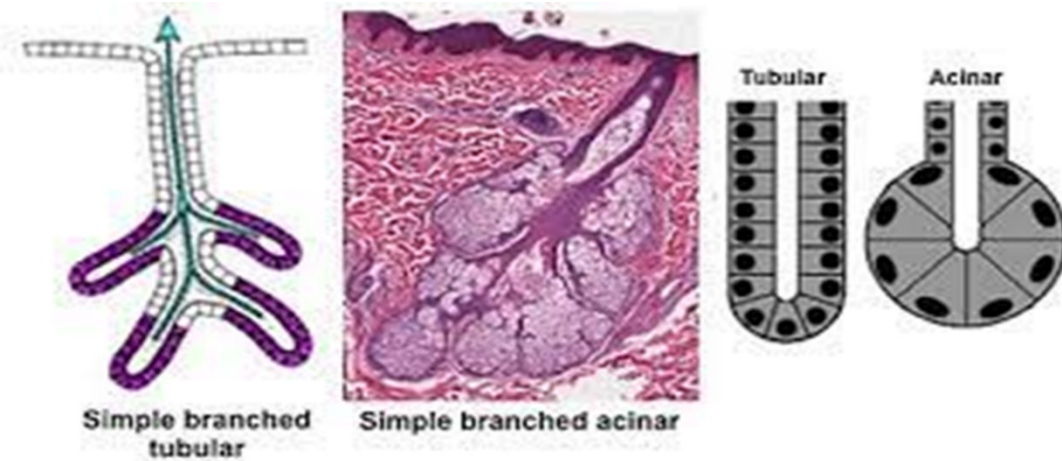


(4) **Simple acinar glands** have a short, unbranched duct; the secretory cells are arranged in acini form. The mucus-secreting glands in the submucosa of the penile urethra are examples of this type of gland.



(5) **Simple branched acinar glands** have a short, unbranched duct, and their secretory cells are formed into branched acini. The sebaceous glands of the skin belong to this type.





## Compound exocrine glands

- (1) **Compound tubular glands** have branched ducts. Their secretory cells are formed into branched tubules as can be found in the Brunner glands of the duodenum.
- (2) **Compound acinar glands** have branched ducts, and the secretory units are branched acini. The pancreas and mammary glands are examples of this type of gland.
- (3) **Compound tubuloacinar glands** have branched ducts, and the secretory units are formed by both an acinar component and a tubular

component

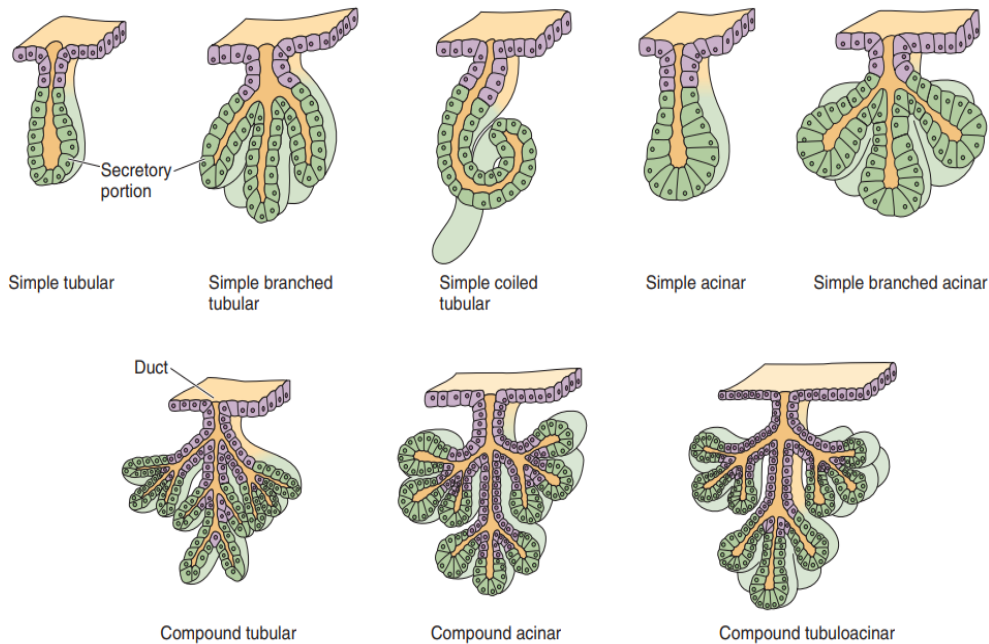


Fig. 1 Types of Exocrine Gland

### **The type of secretory product of exocrine glands:**

**A. Serous Glands:** produce and secrete a non-viscous, watery fluid, such as sweat, milk, tears, or digestive juices. This fluid carries wastes (sweat) to the surface of the skin, nutrients (milk), to a nursing infant, or digestive enzymes from the pancreas to the lumen of the small intestine.

**B. Mucous Glands:** secrete mucins, which forms mucus when mixed with water. Found in such places as the roof of the oral cavity and the surface of the tongue.

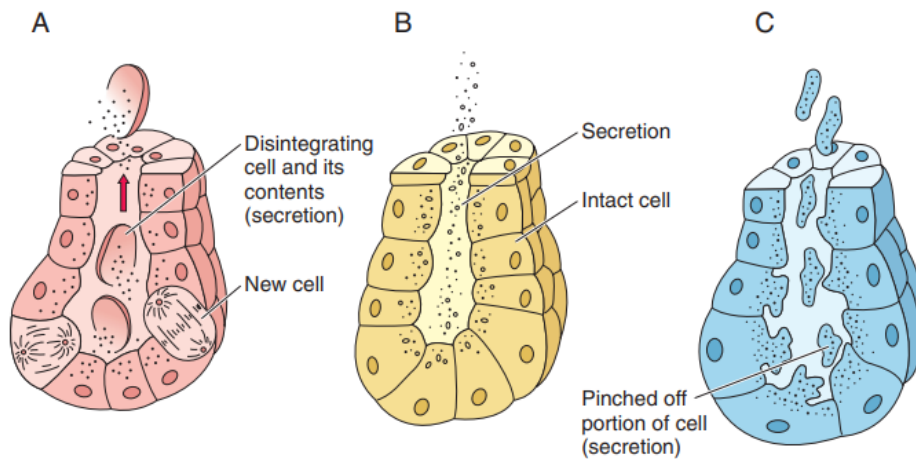
**C. Mixed Glands (seromucous):** such as the salivary glands inferior to the oral cavity, contains both serous and mucous cells, and produce a mixture of the two types of secretions.

### **Mechanisms of secretion :**

**(A) Holocrine glands :** Formed from cells that accumulate a product and then the entire cell disintegrates. Thus, a holocrine secretion is a mixture of cell fragments and the product the cell synthesized prior to its destruction. • The ruptured dead cells are continuously replaced by other epithelial cells undergoing mitosis. The oil-producing glands (sebaceous glands) in the skin are an example of holocrine glands.

**(B) Merocrine glands :**the secretory cells release their contents by exocytosis. They package their secretions in structures called secretory vesicles. • The secretory vesicles travel to the apical surface of the glandular cells, and leave the cell by exocytosis with no loss of other cellular material. • Lacrimal(tear) glands, salivary glands, some sweat glands, the exocrine glands of the pancreas, goblet cell , and the gastric glands of the stomach are examples of merocrine glands.

**(C) Apocrine glands:** Composed of cells that accumulates their secretory products within the apical portion of their cytoplasm. The secretion follows as this apical portion decapitates. So, their mode of secretion is a decapitation. The apical portion of the cytoplasm begins to pinch off into the lumen of the gland for the secretory product to be transported to the skin surface. Mammary glands and ceruminous glands (special types of sweat glands) are apocrine glands.



**Figure 5-19** Schematic diagram of modes of secretion. **A**, Holocrine; **B**, merocrine; **C**, apocrine.

2. **Endocrine glands** may be unicellular (e.g., individual endocrine cells in gastrointestinal and respiratory epithelia) or multicellular (e.g., adrenal gland), and they lack a duct system. These glands that secrete their products through the basal lamina into the blood stream and lack a duct system. These glands often secrete hormones.

## MEDICAL APPLICATION

- Both benign and malignant tumors can arise from most types of epithelial cells. Malignant tumors of epithelial origin are called carcinomas (Gr. karkinos, cancer + oma, tumor). Malignant tumors derived from glandular epithelial tissue are called adenocarcinomas (Gr. adenos, gland + karkinos). Adenocarcinomas are by far the most common tumors in adults after age 45.